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ounce phial, filled with oxygen air, in the glass, with its mouth downwards. These hyacinths were double varieties, which an eminent nurseryman in Fleet-street informed me seldom succeeded in water alone: yet not a single root has ever failed; on the contrary, both the flowers and leaves were bolder and larger than those of the same plants cultivated in the earth with the greatest care.* During the progress of their vegetation the oxygen air in the phial is gradually absorbed, and consumed, no doubt, by the plant.

I have been enabled to produce melons of a higher flavour than usual in our climate, and under very unfavourable management in other respects, by applying oxygen air to their roots, and have no doubt but it would improve all fruits whatever, as well as enable plants to resist the effects of cold.† In no esculent vegetable, however, are the good effects of this vital air more evident than in the Zea Mays, or Indian Corn: as the specimens now exhibited prove, which, though grown in Great Russel-street, equal in size most of those imported from North America.

* These experiments strongly confirm the opinion of our President, stated in the Philosophical Transactions of 1808, that the sap of vegetables becomes saccharine, and prepared to generate their new leaves, by the absorption of oxygen air; who has also suggested that one of the offices of the albuminous tubes is to admit air.—*See*.

† The late Mr. Francis Mason informed me, that he was convinced all the plants which grow wild in the high mountains of Llangloof, Roggeveldt, and other districts at the Cape of Good Hope, there experience a continued degree of frost every winter, which would kill them in our green-houses; possibly the author's theory may account for this, if it appears from accurate investigation, that the air of those heights is considerably more oxygenated than in lower countries.—*See*.

Description of Count Rumford's newly invented Lamps; taken from his Memoirs, read at the Imperial Institute of France, June 24, 1811.

The sixteenth Essay of Count Rumford, lately published here, is the translation of a paper on the management of light in illumination, presented to the Imperial Institute of France; and contains accounts of three species of lamps made on the same principle; the first, a pendulous lamp; the second, a table lamp; and the third, a portable lamp; but it relates principally to the latter.

The pendulous lamp is composed of a cluster of three, four, five, or six cylindrical tubes, containing the wicks, arranged so as to have a double current of air, in the same manner as the Argand lamps, and surrounded by a balloon of twelve sides, 18 inches in diameter.

This balloon is composed of white gauze, or crape, stretched over brass wires, sustained by a horizontal hoop of gilt brass, about an inch broad; which is suspended by six chains, attached to six rods of gilt brass screwed horizontally to this hoop.

The balloon, which encloses the lamp so as to conceal it entirely, may be ornamented in various ways. M. Parquet, a lamp manufacturer in Paris, has proposed to cover the wires, which support the balloon, with small Bohemian crystals, and to form the chains of links composed of large oblong crystals, cut in facets, and encased in gilt brass; the balloon may also be placed in the centre of a large lustre, or be covered entirely with crystals.

When this lamp is intended to illuminate a dining room, the lower half of the balloon should be taken off, and its place be supplied by a screen of gauze or white crape, in

the form of a hoop, of the same diameter as the hoop of gilt brass, which supports the lamp, and five or six inches in breadth.

A lamp, with three burners, is sufficient to illuminate perfectly a dining-room 24 feet long, by 20 feet wide.

The second species of lamp described, is the table lamp; it has a circular reservoir, and only one wick, and is placed upon a column 18 or 20 inches high; when covered by its demi-balloon of crape, it sheds an agreeable lustre, and affords light sufficient to illuminate perfectly a round table, at which 8 or 10 persons may be seated. This lamp requires so little trouble in its management, that the domestics who have charge of it, prefer it to every other.

The portable lamp, which forms the third species of lamp, and that to which the Count's memoir principally relates, is a columnar lamp from seven to eight inches in height, placed upon a circular pedestal, and bearing at its upper extremity a reservoir of oil, in form of a mushroom, from which issues horizontally a handle, (about 5 inches long,) which serves to carry the lamp; a simple tube of tin from four to five lines in diameter, placed in the axis of the column, contains the wick, which is raised or lowered by a rack and pinion, entirely concealed in the column. A glass chimney, placed in the aperture of the top of the column, serves to direct the air, so as to ventilate the flame, and render it more brilliant, and to defend it against the wind.

The column, which is six French lines in diameter, is separable in the middle of its length into two parts, one part entering into the other a little way, so as to fit it tightly; the lower part, which ought to be at least four French inches

and a half in height, is fixed solidly in the centre of the circular pedestal of the lamp: and the upper part is pierced near its lower extremity, with a row of oblong apertures, to admit air to the flame. The reservoir is in the form of a hollow ring, and surrounds the upper extremity of the column; it is nine lines high, and its greatest diameter, which is at bottom, is three inches and eight lines, the top is rounded off in the form of a flattened demi-globe to prevent its intercepting the light, and its upper extremity is placed three lines higher than the level of the upper part of the reservoir.

To the side of this reservoir a hollow horizontal handle is attached, which is from four to five inches in length, fifteen lines in breadth, and nine lines in thickness, and serves as an additional reservoir; a small horizontal tube, three lines in diameter, and from three to four inches in length, is inserted into the bottom of a partition, which separates the handle from the reservoir, and runs along the inside of the handle at its bottom, to within three or four lines of its extremity: another and similar tube is fixed higher up in the partition, and runs along the top of the handle; through the lower tube the oil passes into the handle from the reservoir, and its length and position serve to prevent the oil from overflowing at the burner, when the handle is inclined with its extremity upwards. When the upper surface of the handle, which is flat, passes over the spherical top of the reservoir, a circular aperture, eight lines in diameter, is made into the reservoir to admit the oil; this aperture is closed by a brass stopper, in the centre of which a hole, about a line in diameter, is drilled, to admit the air; and above this tube a small tin cone, an inch in height, and eight lines in diameter, perfor-

ated at its apex, has its base soldered to the upper surface of the stopper; this little cone prevents any oil from flowing over, which might be forced upwards by air, driven from the handle by the heat of the hand; and to render this effect more complete, a small tube two lines in diameter, and five lines high, rises from the top of the cone.

The oil passes from the reservoir to the wick-tube, by a pipe two lines in diameter, which descending obliquely from the flat bottom of the reservoir, passes through the side of the column (or external tube), and proceeds to join the wick tube near its lower extremity. The oil enters into the wick-tube by a very small hole, about a fourth of a line in diameter, at the side opposite to the handle; the smallness of this hole prevents the motion of the lamp from affecting the level of the oil.

To conceal this little pipe, and at the same time to give the lamp a more graceful form, the portion of the column, which is immediately below the level of the bottom of the reservoir is covered with an inverted cone two inches in length, whose base joins the bottom of the reservoir, being of the same diameter with it, and whose apex is cut off to the size of the column, to which it is soldered. About two lines below, where this cone joins the column, the holes, for admitting air to the flame, are formed in the column.

Count Rumford tried many experiments to prevent the bad smell which lamps emit, when burning with a very small flame; which he at last effected, by giving the upper edge of the wick-tube a little prominent brim, about a line in breadth, and in form of a little funnel, which forces back laterally the

ascending current of air, which rises up the glass chimney, and obliges it to come obliquely on the flame at a certain height above the top of the brim; this arrangement keeps the flame at a sufficient distance above the wick-tube to prevent its becoming heated; which heating is the cause of the bad smell, from its evaporating the oil.

In order to regulate the flame of the lamp, without raising or lowering the wick, which the Count found to be a desirable object, he has a tube of about an inch long fitted to the outside of the top of the wick-tube, so as to slide up and down it. This little regulating tube is raised when it is desired to reduce the flame, after the lamp is lighted, and is lowered when a larger flame is required. When it is raised so as to cover the wick entirely, the lamp is extinguished.

The wick which the Count found best for ordinary use, is a flat wick an inch broad, and a line in thickness, which on entering the wick tube becomes bent into the form of a cylinder a little open on one side; which form may be given to it previously, by dipping it in wax or tallow, melted, and made very hot, and rounding it afterwards upon a rod of wood or metal, about two lines in diameter.

To facilitate the renewal of the wick, a little pincer is formed of three elastic hooks, and attached to the apparatus by which the wick is raised: these hooks are pressed into the wick by the sides of the wick-tube. when the rack is moved downwards; and when they are raised above the wick-tube, their elasticity disengages them from the wick spontaneously. In those lamps where the rack is concealed, the hooks are attached to the top of a wire, between three and four inches

long, and a line and a half in diameter, which rises through a brass cellar in the flat bottom of the wick-tube, and is firmly fastened at its lower end to the bottom of the rack.

The species of wick mentioned, is stated to be that best for *ordinary use*; but to those who desire perfection in the lamp, though attended with more trouble, the Count recommends a wick in preference, formed of three small twists of cotton, very round, of about two lines in diameter, rendered stiff and hard by dipping them in melted wax: these are to be tied together at bottom, and introduced into the same wick-tube.

Another species of wick, which the Count thinks might perhaps be the best of all, is composed of two flat wicks, attached together so as to cross each other at right angles, and is placed in a wick-holder of the same form. This wick yields a very beautiful light, and is prevented from heating the tube, by cutting its four upper extremities aslope upward, towards the middle, which causes the flame to withdraw from the sides of the wick tube towards its axis.

To render the flame extremely beautiful, it will be necessary that the cylindrical part of its glass chimney be six inches in height, by at most eight or nine lines in diameter internally; the lower part of the chimney, where it begins to widen, should be from fourteen to fifteen lines in diameter and height. The higher the chimney is, the less is the flame liable to be ruffled by the wind; and when the chimney is both high and narrow, the strongest wind has but little effect on it.

By placing over the top of the glass chimney a cover in the form of a pent-house, made of plate-iron, about two inches in diameter, the lamp will be so completely defended

from wind and rain, that it may be used perfectly well as a lantern.

For ordinary domestic uses, eight inches will be found a convenient height for this lamp, but when used as a table lamp, it should be ten or twelve inches high.

As air inclosed in the wick, or dirt or moisture attached to it, prevents the oil from flowing freely over its fibres, and thus causes it to burn badly, the Count recommends that it be prepared for use by immersing it in boiling wax or tallow, which expels the air and moisture, and prevents dirt from settling on it. Wicks thus prepared, may be preserved for years fit for use, by merely wrapping them in paper. The Count used some which had been laid by ten years, and found them as perfect as when first prepared.

In a Supplement to the Memoir, the Count mentions, that, after several trials, he found a flat wick folded in form of a spout, preferable to that in form of a complete cylinder, before recommended. For this wick, the wick-tube should be flattened at one side, so that its horizontal section, instead of being circular, may assume the form of the letter D.

A portable lamp of this kind gave as much light as four wax candles, of nine and a half lines in diameter; and one with a double current of air gave as much light as seven wax candles, when compared by the Count's photometer. On this occasion, the portable lamp consumed eighteen grains of oil (of refined colza) an hour, a little more than half an ounce, while the lamp with a double current of air, consumed about twice the quantity.

When the portable lamp burns with its full effect, giving as much light as four wax candles, it con-

sumes 3.86 ounces of oil in six hours; when it diffuses no more light than two wax candles, the same quantity of oil lasts for twelve hours.

Dimensions of the Portable Lamp.

	Inches	Lines.
Diameter of the column (or external tube),.....	0	16
Height of do.....	8	4
Greatest diameter of the reservoir at bottom,.....	12	8
Depth to which the glass chimney descends into the column,.....	0	14
Diameter of the wick-tube inside,.....	0	5
Ditto of its conic brim,.....	0	7½
Breadth of the wick (and wick-tube),.....	0	9½
Thickness of the wick prepared in melted tallow,.....	0	1
Lateral aperture of the wick when in its place,.....	0	3½
Interior diameter of the glass chimney at the bottom of the upper cylindrical part	0	9½
Diameter at the top,.....	0	11
Height of the upper cylindrical part,.....	6	8
Total height,.....	15	0
Interior diameter at bottom,.....	0	14
Height of the lower cylindrical part,.....	0	16

Mr. Loyd, 178, Strand, besides the lamps of the kind described, prepares another on the same principles, more easily filled with oil, and having wicks entirely flat fastened to the bottom of the rack by a pincer, made of two flat springs of brass, that diverge spontaneously, to deliver the remains of the old wick, when raised above the wick-tube, but which are compressed to-

gether by the sides of this tube, when forced down, so as to lay hold on the wick: which springs are preferable to the small spring hooks, that answer the same purpose, in the original lamp, as they are not easily broken or deranged.

As these may lamps be very serviceable to tradesmen of several classes, Mr. Lloyd has prepared a plain unornamented sort of them, for their use, at a low price: at the same time that he has others for sale, handsomely finished and varnished, fit for table, and portable lamps for any family. Printers, and other tradesmen, who require a strong portable light, would find the use of these lamps much cheaper, and more wholesome, than the large-wicked candles they at present use, which, from the quantity of soot they produce in burning, have a very injurious effect on the lungs.

In filling with oil the Count's portable lamp described, great care must be taken to pour it in slowly, that it may have time to fill the handle by its horizontal tube at bottom, while the air escapes freely by thit at the top. This is indispensable; for if in pouring in the oil rapidly, the reservoir becomes suddenly filled, the apertures of the two tunnels inclosed in the handles being overflowed, the air will be obstructed in issuing from the cavity of the handle by the upper tunnel, which will prevent the oil from entering freely by the lower tunnel.

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